

**MICROFLUIDIC APPARATUS, SYSTEMS, AND METHODS FOR PERFORMING  
MOLECULAR REACTIONS**

**ABSTRACT OF THE DISCLOSURE**

Disclosed herein are methods, apparatuses, and systems for performing nucleic acid sequencing reactions and molecular binding reactions in a microfluidic channel. The methods, apparatuses, and systems can include a restriction barrier to restrict movement of a particle to which a nucleic acid is attached. Furthermore, the methods, apparatuses, and systems can include hydrodynamic focusing of a delivery flow. In addition, the methods, apparatuses, and systems can reduce non-specific interaction with a surface of the microfluidic channel by providing a protective flow between the surface and a delivery flow.